DOCUMENT RESUME

ED 301 155 IR 013 495

AUTHOR Guerrero, Frank; Swan, Karen
TITLE Computer Pilot Program, 1986-87. OEA Evaluation Report.
INSTITUTION New York City Board of Education, Brooklyn. Office of Educational Assessment.
PUB DATE Jan 88
NOTE 62p.
PUB TYPE Reports - Evaluative/Feasibility (142)

EDRS PRICE MF01/PC03 Plus Postage.
DESCRIPTORS *Administrator Attitudes; Attitude Change; Basic Skills; *Computer Assisted Instruction; Elementary Secondary Education; *High Risk Students; Instructional Effectiveness; Program Evaluation; *Student Attitudes; *Teacher Attitudes
IDENTIFIERS Courseware Evaluation; *Vendors

ABSTRACT

The Computer Pilot Program that was implemented in 19 New York City schools in 1986-87 was designed to investigate the efficacy of computer-assisted instruction (CAI) with the at-risk student population in New York City. The goals of the program were to identify systems that were effective in increasing student attendance and achievement, and in improving student and staff attitudes toward CAI. The program was assisted by the vendors of 10 CAI instructional systems, who placed their systems in appropriate schools and offered staff development, equipment maintenance, and support during the evaluation period. An assessment of the initial impact of each of the systems on student and staff attitudes indicated that school administrators, program coordinators, teachers, paraprofessionals, and students were all generally positive about the systems with which they were involved, and program results suggested that consistent use of any well-structured computer programs dedicated to mathematics and/or reading remediation benefits students in need of extra help. It was recommended that further evaluations be undertaken to determine whether test scores and attendance records support participants' feelings. Descriptions of the programs at each school include detailed descriptions of the use of each of the instructional systems utilized as well as student, teacher, and administrator attitudes at each school. (EW)

****
* Reproductions supplied by EDRS are the best that can be made *
* from the original document. *
****

U.S. DEPARTMENT OF EDUCATION
Office of Educational Research and Improvement
EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)

X This document has been reproduced as received from the person or organization originating it.

☐ Minor changes have been made to improve reproduction quality.

• Points of view or opinions stated in this document do not necessarily represent official OERI position or policy.

COMPUTER PILOT PROGRAM
1986-87

OEA Evaluation Report

"PERMISSION TO REPRODUCE THIS MATERIAL HAS BEEN GRANTED BY

Robert Tobias

TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)."

EVALUATION SECTION REPORT
Robert Tobias, Adminsitrator
John Schoener, Senior Manager

January, 1988

COMPUTER PILOT PROGRAM
1986-87

Prepared by the O.E.A.
Instructional Support
Evaluation Unit

Frank Guerrero,
Unit Manager

Karen Swan,
Evaluation
Consultant

New York Public Schools
Office of Educational Assessment
Richard Guttenberg, Director

IR 013 495

BEST COPY AVAILABLE

It is the policy of the Board of Education not to discriminate on the basis of race, creed, national origin, age, handicapping condition, sexual orientation, or sex, in its educational programs, activities, and employment policies, as required by law. Any person who believes he or she has been discriminated against should contact: Carole Guerra, Local Equal Opportunity Coordinator, Office of Educational Assessment, 110 Livingston Street, Room 743, Brooklyn, New York 11201. Inquiries regarding compliance with appropriate laws may also be directed to: Mercedes A. Nesfield, Director, Office of Equal Opportunity, 110 Livingston Street, Room 601, Brooklyn, New York; or the Director, Office of Civil Rights, U.S. Department of Education, 26 Federal Plaza, Room 33-130, New York, New York 10278.

Acknowledgements

The production of this document is a result of a collaborative effort of full-time staff and consultants. In addition to those whose names appear on the cover, Edwin Aponte, Randy Blank, and David Ludwig visited schools, conducted interviews, and observed the different laboratories. Jonathan Goodman copyedited the manuscript, and Dan Hunt typed and corrected it. The unit could not have produced this report without their cooperation.

EVALUATION SUMMARY

BACKGROUND

The Computer Pilot Program is designed to investigate the efficacy of computer assisted instruction with the at-risk student population in New York City. Funded by the Office of Technology*, the Computer Pilot Program was assisted by the vendors of ten computer-assisted instructional systems, who placed their systems in appropriate schools, and offered staff development, equipment maintenance, and support during the evaluation period.

POPULATION SERVED

In 1986-87, the Computer Pilot Program placed computer laboratories in nine elementary and intermediate schools in Community School Districts 7, 10, 18, 23, 27, 29, and 30, and in the following ten high schools: High School Redirection; Prospect Heights High School; Theodore Roosevelt High School; George Washington High School; Samuel J. Tilden High School; John Jay High School; Thomas Jefferson High School; Martin Luther King Jr. High School; Susan Wagner High School; and South Bronx High School. The program was targeted for an at-risk population in grades three through twelve, including students with poor attendance records and those requiring supplemental basic skills instruction.

PROGRAM OBJECTIVES

The goals of the Computer Pilot Program were to identify systems that are effective in increasing student attendance and achievement, and in improving student and staff attitudes toward computer assisted instruction. The program's objectives for the 1986-87 school year were to successfully complete system implementation and staff training, and to begin utilization of each of the systems at 19 selected schools.

EVALUATION METHODOLOGY

Evaluation of the program described the implementation and utilization of the program at each of the 19 school sites, and assessed the initial impact of each of the systems on student and staff attitudes. Interviews were conducted with program administrators and coordinators, teachers and paraprofessionals implementing the program, and with a sample of students.

---

*In the fall, 1987, the Office of Technology changed its name to the Division of Computer Information Services.

Interviews focused on evaluating computer software and hardware program implementation and staffing, and staff and student perceptions of the program. Visits to the computer laboratories at all sites were made to complete the interviews and observe the various programs in operation.

FINDINGS

By the end of the 1986-87 school year, vendor systems were installed and operational in all 19 schools. School administrators, program coordinators, teachers, paraprofessionals, and students were all generally positive about the systems with which they were involved. Hardware and software problems had been or were being satisfactorily resolved by the vendors, and school staff had received training. The generally positive reports from staff and students at all sites indicated that the consistent use of any well-structured computer programs dedicated to mathematics and/or reading remediation benefits students in need of extra help.

RECOMMENDATIONS

On the basis of the findings and other information presented in this report, the following recommendations were made:

- The 1987-88 investigation should concentrate in determining whether test scores and attendance records support participant feelings. Research should additionally include a closer analysis of the systems to determine which are beneficial to particular student groups.

- Other important areas to evaluate should include: the cost-effectiveness of the systems; time-on-task; ease of use; level of vendor support; and significant problems with hardware and/or software.

Table of Contents

		Page
I.	Introduction	1
	Background	1
	Population Served	2
	Program Objectives	3
	Program Evaluation	3
	Scope of Report	4
II.	Program Evaluation	5
	Program Administration	5
	Autoskills	5
	Computer Curriculum Corporation/Instructional Systems Inc.	13
	Comprehensive Competencies Program	16
	Corvus/Ideal	21
	Degem	23
	PALS	32
	PC/Class	36
	Plato	40
	Tandy/ESC	43
	WICAT	46
III.	Conclusions and Recommendations	50
	Summary	50
	Conclusions	50
	Recommendations	54
	Figure 1: Systems in the Computer Pilot Program	6

I. INTRODUCTION

BACKGROUND

In an educational system as large and diverse as New York City's public schools, traditional methods of education may not succeed for all students. Students in need of basic skills remediation, in particular, might benefit from alternative means. At the same time, technological innovations are being developed which offer individualized instruction in a wide range of subject areas. Schools are trying out computer-assisted programs; integrating computer-based materials into existing curricula. The Office of Technology's* Computer Pilot Program was designed to investigate such educational uses of computers, and explore the efficacy of their use with New York City's at-risk population.

The Computer Pilot Program was funded by the Office of Technology in conjunction with the vendors of 10 computer-assisted instructional systems -- the UNISYS Autoskills program, the Computer Curriculum Corporation's (C.C.C.)/Instructional Systems Inc. (I.S.I.) system, the Comprehensive Competencies Program, CORVUS/Ideal, the DEGEM system, IBM PALS, the IBM PC Class system, PLATO, WICAT, and the Tandy/ESC system. Vendors placed their systems in appropriate schools, and offered staff development, equipment maintenance, and support at little or not cost for the evaluation period. Individual schools were

---

*In December, 1987, the Office of Technology changed its name to the Division of Computer Information Services.

responsible for staffing the programs and providing time for staff development. The Office of Technology provided additional equipment, technical assistance and coordination among all the groups involved in the Computer Pilot Program.

POPULATION SERVED

During the 1986-87 school year, the Computer Pilot Program placed computer laboratories in nine elementary and intermediate schools in Community School Districts 7, 10, 18, 23, 27, 29, and 30, and in the following ten high schools: High School Redirection; Prospect Heights High School; Theodore Roosevelt High School; George Washington High School; Samuel J. Tilden High School; John Jay High School; Thomas Jefferson High School; Martin Luther King Jr. High School; Susan Wagner High School; and South Bronx High School. The program was targeted for an at-risk population in grades three through twelve including students with poor attendance records and those requiring supplemental basic skills instruction. Each school was responsible for selecting a target group of students in need of remediation in basic reading and/or mathematical skills, and for scheduling that group in compliance with the stated needs of the particular system they were using. In addition, schools had to identify a control group of students with similar needs in remediation.

PROGRAM OBJECTIVES

The goals of the Computer Pilot program were to identify systems which are effective in increasing student attendance and achievement, and in improving student and staff attitudes toward instruction. The program's objectives for the 1986-87 school year were to sucessfully complete system implementation and staff training, and to begin utilization of each of the systems at 19 selected schools.

PROGRAM EVALUATION

The purpose of the 1986-87 evaluation by the Office of Education Assessment/Instructional Support Evaluation Unit (O.E.A./I.S.E.U.) was to describe the implementation and utilization of the programs at each of the 19 school sites, and to assess the initital impact of each of the systems on student and staff attitudes. Interviews were conducted with program administrators and coordinators, teachers and paraprofessionals implementing the programs, and with a sample of students. The interviews focused on evaluating computer hardware and software and program implementation and staffing, and on assessing the expectations and perceptions of the staff and students involved. Visits to the computer laboratories at all sites were made to complete the interviews and to observe the various programs in operation.

SCOPE OF THE REPORT

This report presents the results of the preliminary evaluation of the Computer Pilot Program. An overview of the systems being evaluated, details of site implementations, and staff and student perceptions of the various systems are presented in Chapter II. Conclusions and recommendations are discussed in Chapter III.

II. PROGRAM EVALUATION

PROGRAM ADMINISTRATION

Most school sites were chosen by the Chancellor, and, at each school, a coordinator was selected by the school or the district to be responsible for the day-to-day operations of the program computer laboratory. During the 1986-87 school year, systems from all ten vendors were put into operation. Figure 1 lists each system and the school(s) in which it was placed. A description of each of the systems and a summary of site-specific details for each follows:

AUTOSKILLS

Autoskills, a remedial phonics program for grades kindergarten through ten, runs on a proprietary network from Unisys. Based on the assumption that comprehension automatically follows from fluency, the program does not specifically address comprehension skills. Autoskills provides individualized training in three areas of reading difficulties: visual matching (matching letters and words on the screen), auditory-visual matching (matching letters and words with their sounds), and oral reading. Headphones and taped speech are used in the audio sections of the program. A management component charts students' progress and produces graphs that detail their placement within the system in terms of mastery and speed over time. Immediate feedback is available to students only in their interactions with a teacher or paraprofessional.

Autoskills stresses early intervention and involves

Figure 1

Systems in the Computer Pilot Programs,
by Schools, 1986-87

System	School-
Autoskills	P.S. 246X I.S. 231Q High School Redirection
Computer Curriculum Corporation/I.S.I	Prospect Heights High School
Comprehensive Competencies Program	Theodore Roosevelt High School George Washington High School
Corvus/Ideal	Samuel J. Tilden High School
Degem	P.S. 114Q P.S. 268K I.S. 252K I.S. 210Q John Jay High School
PALS	Thomas Jefferson High School Martin Luther King Jr. High School
PC/Class	I.S. 141Q Susan Wagner High School
PLATO	South Bronx High School
Tandy-ESC	P.S. 332K
WICAT	P.S. 31X

intensive teacher/paraprofessional participation for both diagnostic and prescriptive functions. The audio component requires students to repeat sounds aloud to either a teacher or a paraprofessional to show mastery and move on to the next level of difficulty. A teacher or paraprofessional must also assess student mastery of all lessons and prescribe appropriate remediation within the system. Autoskills is designed for four 30-minute sessions a week. Its authors maintain that strict adherence to this schedule will result in gains of one grade level for every 20 weeks spent in the program.

The Unisys network also comes with a powerful ICON software package offering facilities that include word processing, graphics, games, and the Logo computer language. For purposes of evaluation, schools were asked to use Autoskills alone.

P.S. 246

In December, 1986, 15 Autoskills workstations were installed at P.S. 246 in the Bronx, where they were used by 100 Chapter I students in the fourth grade. Four paraprofessionals worked with eight classes of students for 30 minutes each day and maintained all student records. Each student had a personal computer available for the entire laboratory period. There was one paraprofessional available for every five students. In addition to the Autoskills workstations, the school also has Tandy and Apple computers that may have been used by the targeted students.

One administrator, one computer coordinator, six teachers, and eight students were interviewed.

Staff. The administrator believed that Autoskills was useful, particularly because teachers became more aware of particular decoding weaknesses in individual students, and the general importance of phonics instruction. The computer coordinator believed that Autoskills had a positive impact on student attitudes and achievement, citing dramatic individual gains. She also thought that staff attitudes toward computers had improved as a result of the intervention. Both the administrator and computer coordinator regretted the large amount of paraprofessional time the system absorbed. In particular, the one-on-one use of teachers/paraprofessionals in the auditory component of Autoskills meant that "only one child at a time could be an oral child," which limited students' use of the program. Both the administrator and coordinator thought that system reports showing specific areas in which students needed help would be useful and would reduce the time required of teachers/paraprofessionals.

Teachers. Classroom teachers likewise believed that system reports telling them the exact errors their students made would be more useful than the graphs currently provided by Autoskills. They reported that they found the system most useful in improving student motivation (one teacher found it minimally useful; two teachers, moderately useful; three teachers, very useful) and achievement (five teachers, moderately useful; one

teacher, very useful), and moderately useful in improving student attendance (two teachers, minimally useful; three teachers, moderately useful); and attitudes (one teacher, minimally useful; four teachers, moderately useful; one teacher, very useful), although most stated that they did not integrate Autoskills lessons with their classroom teaching, since this school district does not use a phonics approach in its reading strategies. Teachers also commented that the person speaking on the audio tape had a Canadian accent that both they and their students found difficult to understand.

Students. Students were generally pleased with the system and said they enjoyed working with it, although some expressed a desire for feedback on their incorrect responses. They uniformly reported that they enjoyed school more, that they felt better about themselves and their learning, and that they had more reason to come to school as a result of their experience with Autoskills.

J.H.S. 231

In January, 1987, Autoskills became operational on 15 work stations at J.H.S. 231 in Springfield Gardens, Queens. It was used by 35 mainstreamed and special education students in the seventh and eighth grades. Students worked for four 40-minute sessions per week. Five teachers supervised them. There was a seven-to-one student/teacher ratio for mainstreamed students, and a five-to-one student/teacher ratio among the special education population. No paraprofessionals were available to help out in

the laboratories. During laboratory time, one computer was available for every student in the program. The school also has IBM, Apple, and Commodore computers that the targeted students used in addition to the Autoskills work stations.

One administrator, one lab coordinator, three teachers, and six students were interviewed.

Staff. The adminitsrative staff believed that students arriving in junior high school with poor phonics skills benefited from Autoskills because the traditional curriculum does not allow time for phonics remediation. They agreed that ICON software should be used in addition to Autoskills. The administrator believed that while the training provided was adequate, the school needed more training, and more personnel, especially paraprofessionals. The coordinator noted that because Autoskills reports only the number of student errors and not their actual mistakes, classroom teachers could not receive a report with feedback to help them in their classes.

Teachers. The teachers interviewed thought that the Autoskills system was moderately useful in increasing students' motivation (two teachers found it moderately helpful; one teacher, very helpful), increasing attendance (one teacher, minimally helpful; two teachers, moderately helpful), increasing students' achievement (one teacher, minimally helpful; two teachers, moderately helpful), and improving student attitudes (one teacher, minimally helpful; two teachers, moderately helpful). Some teachers believed that Autoskills takes up

teacher time that could better be utilized by traditional methodology. Most thought that other ICON software, as well as Autoskills, should be used, and that the addition of paraprofessionals, more training, and more time for initial planning and testing would be helpful.

Students. Although students unanimously agreed that their use of the Autoskills system made them feel better about themselves and their learning, they had a mixed response regarding their enjoyment of school and their desire to attend (two students agreed, but four did not with the statements that the system helped them enjoy school more and increased their desire to attend). They stated that the program taught them to pronounce words, but some found it boring. Some students also expressed difficulty in using the headphones and understanding the taped voice.

High School Redirection

In February, 1987, the Autoskills Program became operational at High School Redirection in Brooklyn, where it was used with 25 older non-readers in the ninth through twelfth grades. Students were scheduled for one period per week, but could also use the system during their free time. Nine teachers and three paraprofessionals supervised students at ten workstations. There was a three-to-one student/staff ratio; and a one-to-one student/computer ratio in the laboratory. In addition to Autoskills' workstations, the school's Tandy and Apple computers were also used by the targeted students.

One administrator, one coordinator, eight teachers, and three students were interviewed.

Staff. The administrator believed that the Autoskills Program achieved good results with older non-readers, but that terminals should be set up in classrooms. She indicated that teachers had to leave their rooms to use the Autoskills Program; therefore, their access to the system was limited. He also expressed concern about teacher satisfaction due to the volunteer nature of the pilot program, and stated that he would like to see Autoskills integrated into the regular program. The coordinator thought that student attitudes, but not attendance, had improved as a result of their experience with the Autoskills Program. She indicated that it was too early to tell whether student achievement was improving, but thought that it was. The coordinator said that staff attitudes had not improved as a result of the pilot program.

Teachers. Like administrators, teachers also indicated that Autoskills terminals should be placed in classrooms to facilitate a greater degree of monitoring, and that Autoskills should be integrated into the regular curriculum. They thought that Autoskills was moderately productive in improving students' motivation (two teachers found it minimally useful; six teachers, moderately useful), attendance (one teacher, not useful; two teachers, minimally useful; five teachers, moderately useful), achievement (two teachers, minimally useful; five teachers, moderately useful; one teacher, very useful), and attitudes (one

teacher, not useful; two teachers, minimally useful; four teachers, moderately useful; one teacher, very useful). Many teachers thought that younger students would gain more using the system, but that the targeted population was making good progress within it. Some teachers noted that the one-on-one oral component of the program disturbed other students.

Students. Students indicated that the system was easy to use and helped them learn to read. They unanimously said that their use of the system helped improve their perceptions of themselves and their learning abilities, their enjoyment of school, and their desire to attend school.

COMPUTER CURRICULUM CORPORATION/INSTRUCTIONAL SYSTEMS INC.

The Computer Curriculum Corporation's basic skills programs provide individualized instruction to students at up to 128 remote terminals. It can operate in several schools at once, with remote sites connected to the central processor (MICROHOST) by modem. Drill and practice exercises (consisting of multiple choice and short answer questions) are available in reading and mathematics for elementary school, middle school, and high school students. These are presented to each student at his or her appropriate level.

Student progress is monitored through the MICROHOST management system, which checks a student's performance history, selects and presents individualized exercises, analyzes the student's responses to each exercise, and updates and stores his or her performance records. When a student achieves a high

degree of success, the difficulty of the material is increased. The system provides the student with immediate feedback during each lesson, and with a score for the series of exercises at the end of each lesson.

The MICROHOST management system also makes student progress reports available to teachers or administrators on request. Progress reports list each student's current position by grade level and lesson by lesson, and point out low-performance areas to facilitate grouping of students for further instruction. In addition, they describe student progress over time, both in 20-session schedules and for the total time spent using the system, and show student progress in each of several categories of mathematics and reading skills. The basic skills program is organized in 10- to 20-minute sessions. Its authors suggest that students complete three to five sessions each week.

Prospect Heights High School

At Prospect Heights High School in Brooklyn, the MICROHOST was connected to 33 IBM computers in November, 1986. It was used by 200 Chapter I students in grades nine and ten for remedial mathematics and reading skills throughout the remainder of the school year. Six remedial mathematics classes met for three 40-minute periods a week, and four remedial English classes met for two 40-minute periods a week. Four teachers and two paraprofessionals accompanied their classes in the laboratory, and were available for coaching students on the use of the system. There was a 20-to-1 student/staff ratio and a

one-to-one student/computer ratio in the laboratory. The targeted students did not use the school's other Apple and Tandy computers.

For both technical and security reasons, implementation of the program proved difficult to handle at this site and at one other school originally linked to the system. Considerable technical expertise is required in order to utilize the modem, which transmits data to remote sites. The remote site originally included in the project accordingly never became fully operational and was withdrawn from this evaluation. At Prospect Heights High School, 14 keyboards and a printer were stolen. The loss of the printer made the reporting component of the system practically useless.

One administrator, one coordinator, three teachers, and five students were interviewed.

Staff. The administrator and the computer coordinator had a generally positive reaction to the system, attributing to it noticeable improvements in attendance and attitudes among the students involved in the program. They thought that achievement could not be judged at this early stage, and stated that it would be useful to have another telephone line installed in the laboratory to facilitate calls for technical assistance. They also indicated that they would like to see more students involved in the program.

Teachers. Teachers were surprised that students were interested and eager to learn how to use the C.C.C. system. They

also noted a gain in attendance. They found the system moderately to very helpful in increasing student motivation (one teacher found it moderately helpful; two teachers, very helpful), attendance (one teacher, moderately helpful; two teachers, very helpful), achievement (two teachers, moderately helpful; one teacher, very helpful), and attitudes (two teachers, moderately helpful; one teacher, very helpful). Teacher reactions to the system varied. Some teachers believed that it was too difficult to monitor individualized instruction, whereas others thought that the material should be broken down further to address individual weaknesses more closely. One teacher thought that time spent using the system could be better spent in traditional classroom activities; others believed that the more positive attitudes and better attendance of the students made the system worthwhile.

Students. Students reported that they liked the C.C.C. system and that it helped them with their homework. They all thought that their use of the system made them feel better about themselves and their learning, and most thought that they enjoyed school more (three students agreed with the statement, two did not) and, as a result, were motivated to attend (four agreed, one did not).

COMPREHENSIVE COMPETENCIES PROGRAM

The Comprehensive Competencies Program uses a combination of printed materials, computer software, and audio-visual aids to teach both basic and functional skills. The basic

skills component of the program provides remediation in reading and mathematics; the functional skills component teaches occupational and life skills. The computer software that is used by the program runs on both Apple and IBM computers.

The Comprehensive Competencies Program is a learning-by-objectives program designed for an older, at-risk population. It uses predesigned lessons, assignments, and tests that are individually sequenced, allowing learners to proceed at their own pace. A learning center accommodates many students working on different objectives and/or at different levels at the same time. The computer software provides each student with immediate feedback as to how well he or she is meeting the prescribed objectives. Tests are corrected by the Computerized Information System, and a management component keeps track of the time students take to master each lesson. The system is organized into 45-minute sessions, but requirements for sequencing the sessions are flexible.

Theodore Roosevelt High School

The Comprehensive Competencies Program began at Theodore Roosevelt High School in March, 1987, using seven Apple computers. Forty-six mainstreamed Chapter I students and 12 special education students in the ninth and tenth grades participated in the program, using the laboratory for two 45-minute periods every day. Three teachers, a counselor, a computer coordinator, and two paraprofessionals were involved in the program, which maintained a ten-to-one student/staff ratio.

Students worked on computers both by themselves and in teams of two or three. The school also has MacIntosh, VIP, Tandy, and Apple II computers, but these were not used by targeted students.

The opening of the laboratory at Theodore Roosevelt was delayed until March because Apple computer components had been stolen and needed to be replaced. Additional problems with Apple software had also developed and needed to be remedied. In addition, the arrival of IBM equipment and software was held up by contractual difficulties between the Board of Education and IBM.

One administrator, one coordinator, one counselor, three teachers, and seven students were interviewed.

Staff. The administrator and coordinator were generally positive about the system, primarily because they believed that participating students' attitudes toward school had improved as a result of the intervention, and that there was a corresponding improvement in attendance, achievement, and students' pride in their work. They also believed that the program had resulted in a greater awareness among teachers concerning individual students' potential for success. The administrator stated that the system provided "a needed other mode of instruction to motivate and excite students while learning." Both believed that the training provided was adequate, but believed that more time was needed for teachers to preview software before it was presented to the students.

Teachers. Although teachers also indicated that they

needed more time to preview the software provided with the program, all integrated the program into their regular classroom activities. They believed it was helpful in improving students' motivation (one teacher found it moderately helpful; two teachers, very helpful), attendance (two teachers, moderately helpful; one teacher, very helpful), achievement (two teachers, moderately helpful; one teacher, very helpful) and attitudes (one teacher, minimally helpful; two teachers, moderately helpful). Teachers specifically noted an increase in students' personal pride and motivation. Some thought they had not received adequate training, and one teacher reported that the transition from classroom teaching to individualized instruction was difficult. All teachers thought more paraprofessionals would be useful.

Students. Students said they liked using computers, and that using them helped improve their schoolwork. They generally agreed that their participation in the program had improved their enjoyment of school (four agreed, one did not), their desire to attend (three agreed, two did not), and their feelings about themselves and their learning abilities (four agreed, one did not).

George Washington High School

In May, 1987, the Comprehensive Competencies Program was put into operation at George Washington High School in Manhattan. Using three Apple and three IBM computers, the program served 44 Chapter I students in grades nine and ten. Two

teachers and a paraprofessional supervised students' work in the program. There was a 20-to-1 student/staff ratio in the laboratory, with students working on the computers both alone and in small groups. They had two 45-minute laboratory sessions every day. The school has other IBM and Apple computer laboratories, which the targeted students also used.

One administrator, one coordinator, two teachers, and five students were interviewed.

Staff. The administrator and the coordinator at George Washington High School believed that computers were a valuable motivational tool for both students and staff alike. They considered the program an excellent supplement to the traditional curriculum and an aid in increasing student attendance, but thought it was too soon to judge its effectiveness. They agreed that the training participating teachers received was very useful, but thought that additional compensatory time was needed for teachers to review the software, and that more computers would be a great help.

Teachers. Both teachers interviewed believed that the program was very useful in increasing students' motivation, achievement, and attitudes, and moderately useful in increasing their attendance. Both reported integrating the program with their regular teaching activities. They stated they would like to spend more time getting to know the capabilities of the computers, and that they would like to receive further on-going training. The teachers agreed that more computers were needed.

Students. Students said that they liked computers, and that they enjoyed school more as a result of their participation in the program. Most, however, did not agree that their computer experience improved either their self-image (two agreed, three did not) or their attendance (one agreed, four did not).

CORVUS/IDEAL

The Corvus/Ideal system involves a combination of hardware and software provided by two different vendors. Corvus provided network hardware to link Apple and/or IBM computers to a central, 20-megabyte hard disk server, allowing individual students to work at their own pace. Ideal provided the software, which included drill and practice lessons in reading, language arts, and basic mathematics skills. Ideal also provided a management component that tracks students' progress by counting completed objectives and produces computer printouts that show students' scores by lessons and objectives. Teachers may determine pass/fail percentages for each objective. Suggested use of the system is for three 40-minute sessions per week.

Samuel J. Tilden High School

At Samuel J. Tilden High School in Brooklyn, 19 Apple computers linked by the Corvus/Ideal system became operational in March, 1987. They served 40 Chapter I students in grades nine and ten for remedial reading and mathematics practices. They used the system for three 40-minute periods each week. Three teachers and three paraprofessionals were involved in the

intervention. There was a seven-to-one student/staff ratio in the laboratory, with some students doubled-up on computers. The school's other IBM, Tandy, and Apple computers were not used by students in the program.

One administrator, two teachers, one paraprofessional, and nine students were interviewed.

Staff. The administrator was enthusiastic about the program, primarily because "the kids and teachers were turned on." He noted improved student attendance and achievement, and improved teacher performance as evidence of the program's success. He thought that more teacher training and more computers were needed, and stated that he would like to extend the program to include the school's general education population.

Teachers. Teachers believed that the Corvus/Ideal system provided a positive reinforcement to classroom learning. They all thought that the system was very useful in improving students' motivation, attendance, and attitudes, and most thought that it was moderately useful in improving their achievement (two teachers found it moderately useful; one teacher, very useful). They thought that they needed more training with the system before they could integrate it into their classroom teaching, and that more computers were needed.

Students. Students were very positive about the system. They found it fun to use and easy to learn, and reported that it helped them with their school work and taught them things they didn't know before. All the students interviewed agreed that the

system gave them more reason to attend school and made them feel better about themselves and their learning abilities; and most agreed that the system made school more enjoyable (eight agreed, one did not).

DEGEM

The DEGEM system, a computer-assisted instruction package based on the Digital Equipment Corporation (DEC) PDP11/23 mini-computer, can support up to 64 student terminals, each equipped with a monochrome monitor and built-in touch keypad. It can be supplied with courseware packages covering drill and practice in elementary mathematics, language arts, reading, keyboarding, English as a Second Language, algebra, and physics, and educational games. The approach taken assumes that initial presentation of a topic, follow-up, and application are all best done by the teacher in the classroom, whereas the computer is the ideal medium for practice, evaluation, and testing.

The DEGEM system includes a comprehensive management package with the capability of monitoring and tracking individual student performance, and of preparing student and/or class performance records and comprehensive class and level reports. It automatically provides detailed diagnostics at every ability level to ensure that the students are working at their actual level of competency. After diagnostics, a practice phase begins, through which students advance as they master the material. If a student has problems, the teacher is notified through special notations on the progress reports.

The system also offers an authoring system that allows teachers to create their own courseware, a test development facility for creating tests on-line, programming tools, and administrative routines.

P.S. 114

In February, 1986, the DEGEM system was installed at P.S. 114 in Queens. Consisting of 32 workstations, the system was used by 680 general education students and 50 special education students in grades two through six for practice and remediation in mathematics. Students used the system for one 30-minute session each week as part of their regular mathematics classes. Sixteen teachers and one paraprofessional took part in the program. There was a 28-to-1 student/teacher ratio in the laboratory, with a terminal available to every student. The school also has Apple computers that the targeted students used in addition to the DEGEM system.

One administrator, one coordinator, and ten students were interviewed.

Staff. Both the administrator and the coordinator noted a positive improvement in students' achievement, attendance, and attitudes as a result of their use of the system. They thought that the attitudes of participating teachers had improved as well. Both believed that the training provided was adequate, but the administrator thought that more training for teachers on the reading of system reports, as well as additional software for enrichment, would be useful.

Students. Student responses to the DEGEM system were mixed. Most agreed that they enjoyed using the computers, and that they enjoyed school more as a result of the program (eight agreed; two did not). Almost half the students said they had more reason to attend school (four agreed, six did not) and half felt better about themselves and their learning abilities (five agreed, five did not). Although some students thought the system was boring, and some found the keypad difficult to use, most students thought that it was fun to use and helped them with mathematics.

P.S. 268

In April, 1986, the DEGEM system was put into operation at P.S. 268. Thirty-two terminals were used by 680 general education, Chapter I, and special education students in grades one through six for drill and practice in mathematics. Twenty-three teachers and one paraprofessional were involved in the program. Teachers accompanied their classes to the laboratory for two 20-minute sessions a week. Some classes were too big for the laboratory to accommodate. In these classes, a one-to-one student/computer ratio was maintained by having some students sit out on a rotating basis. There was a 13-to-1 student/staff ratio in the primary grades and a 16-to-1 student/staff ratio in grades four, five, and six. The school also has Apple and Tandy computers, which some of the targeted students used in addition to the DEGEM system.

One administrator, one coordinator, four teachers, and

ten students were interviewed.

Staff. The administrator indicated that, based on her review of the system-generated printouts, there had been improvement in student achievement. However, student attitudes and attendance, as well as staff attitudes, had not changed as a result of the intervention. She thought that the training provided was adequate, but recommended a restructuring of the printouts to facilitate teacher planning for remediation. The coordinator likewise thought that the students were progressing well within the DEGEM system, and noted an improvement in both their work and their attendance. She expressed a high level of satisfaction with the training provided by DEGEM. Both the administrator and the program coordinator said that an additional paraprofessional in the laboratory would be more effective.

Teachers. The teachers interviewed stated that they liked the DEGEM system, but that the lessons did not push students to their limits, and that often the work was easier than the level of work taught in their classrooms. They did not integrate students' work on the system with their classroom work. Some teachers believed that the system would be improved by enabling them to select instructional objectives.

Students. Most students interviewed said that they found the DEGEM system fun and exciting, and that it improved their work in mathematics. Most agreed that the system helped them enjoy school more (seven agreed, three did not), and all but one student reported feeling better about themselves and their

learning abilities as a result of their participation in the program. Four of ten students thought they were more inclined to attend school. Some students, however, found the system boring, and some were disappointed that it did not provide immediate feedback for incorrect answers.

I.S. 252

In March, 1986, the DEGEM system became operational at I.S. 252 in Brooklyn, where it was used by 789 general education students and 30 Chapter I students for both reading and mathematics. Eight teachers used the laboratory, which had 32 workstations. Students had one 40-minute session in the computer laboratory each week, and their work there was integrated with their regular classroom activities. A one-to-one student/computer ratio, and a 32-to-1 student/teacher ratio was maintained. There are no other computers in the school.

One administrator, one coordinator, and seven students were interviewed.

Staff. Both the administrator and the coordinator interviewed believed that the DEGEM Program was successful, and that it had a positive effect on student achievement. The coordinator thought that insufficient problems were presented in some areas (e.g. time) and noted that the system required a significant commitment on the part of staff to keep lessons from becoming repetitive and boring for the students.

Students. Most students found the DEGEM system fun, easy to use, and a help with their mathematics learning. Most

agreed that their use of the system had improved their enjoyment of school (five students agreed, two did not), their desire to attend (four students agreed, three did not), and their feelings about themselves and their learning abilities (six students agreed, one did not). However, they sometimes found it boring and/or too easy. Ninth-graders commented that there were no algebra problems. The lack of immediate feedback for wrong answers was also cited as a problem.

J.H.S. 210

During February, 1986, DEGEM was installed in a 32-terminal computer laboratory at J.H.S. 210 in Queens. It was used for drill and practice in mathematics, English, and typing by 95 seventh- and 93 eighth-grade general education students, 200 special education students, and 150 adult and gifted students. Twenty-one teachers, two paraprofessionals, and a laboratory coordinator were involved in the intervention. A 16-to-1 student/staff ratio and a one-to-one student/computer ratio were maintained in the laboratory, and DEGEM activities were fully integrated with classroom activities by planning instruction based on system-generated reports and maintaining regular class schedules based on use of the DEGEM system for 20 minutes for two class periods per week. The school also has Apple computers, which were used by some of the students in the program.

One coordinator, six teachers, and eight students were

interviewed.

Staff. The coordinator reported that there had been a tremendous growth in student achievement and attendance as a result of their use of the DEGEM system, stating that after one year it had an positive impact on every student using it. He said that the training provided by the DEGEM system's staff had been excellent, as was the attitude of most teachers, and that the system was very easy to use. He thought, however, that if reports were generated by topic in ascending/descending order and included graphics, assessment would be easier.

Teachers. Most teachers said that the reports generated by the system were excellent, and that the system had a positive impact on students' motivation (three found it moderately helpful; three teachers, very helpful), achievement (one teacher, minimally helpful; two teachers, moderately helpful; three teachers, very helpful), and attitudes (five teachers, moderately helpful; one teacher, very helpful). The teachers' responses were mixed when they were asked whether use of the system had improved attendance (two teachers, not helpful; one teacher, minimally helpful; three teachers, moderately helpful).

Students. Most students stated that they found the system easy to use, interesting, and fun, and that it particularly helped them with their work in mathematics. Most students also agreed that their use of the system improved their enjoyment of school (seven students agreed, one did not), their desire to attend (five students agreed, three did not), and their

feelings about themselves and their learning abilities (six students agreed, two did not agree to the two statements). Some, however, found the system boring, and some experienced difficulty in using the keypad.

John Jay High School

In September, 1986, the DEGEM system was implemented in Brooklyn at John Jay High School, which had 32 DEC terminals. It was used for two 40-minute periods per week by six Chapter I reading classes and nine Chapter I mathematics classes, and once a week by eight general education mathematics classes. A total of 351 students, ten teachers, and one paraprofessional were involved in the program. There was a 20-to-1 student/staff ratio and a one-to-one student/computer ratio in the room. The school's IBM and Tandy computer terminals were also used by some of the targeted students.

One administrator, five teachers, and eight students were interviewed.

Staff. At this school, there were problems with the system's hardware and software. The administrator said that he needed a better environment and more hardware. He indicated that teacher involvement was good and that students seemed to like the program. He was optimistic that the program would have a positive impact on student achievement.

Teachers. Teacher response to the DEGEM system was positive. Most believed that students' use of the system had resulted in improved motivation (one teacher found it minimally

helpful; one teacher, moderately helpful; three teachers, very helpful), attendance (one teacher, minimally helpful; three teachers, moderately helpful; one teacher, very helpful), achievement (four teachers, moderately helpful; one teacher, very helpful), and student attitudes (four teachers, moderately helpful; one teacher, very helpful). The teachers interviewed thought that the training they received was very good, but requested a refresher course, as well as more intensive training in report analysis. The language arts teacher interviewed stated that the software had grammatical errors that should be corrected, and indicated that more emphasis should be placed on idiomatic usage. Mathematics teachers thought that more exact and immediate feedback should be given to the students, and that too many topics were encountered by the students at one time. Overall, however, teachers found the system conducive to individualized instruction and motivating for the students.

Students. Most students agreed that school was more enjoyable (six students agreed, two did not), and all students agreed that they felt better about themselves and their learning abilities, as a result of their participation in the program. But they did not agree that the program increased their desire to attend school (two agreed, six did not). Most students said that the system was fun and easy to use, and that it helped them in their school work, but some found the system boring and repetitious.

PALS

The IBM Principle of the Alphabet Literacy System (PALS) is a high technology, mixed media system that makes use of the IBM InfoWindow system, touch screens, CAV video disk, and audio headsets to provide interactive, individualized instruction for up to 16 students at a time in each PALS lab. The touch screens, which allow students to make responses by touching the screens rather than by using the keyboard, are based on the assumption that this technology enables students to concentrate on the material at hand. Students are additionally taught keyboarding skills on the PCjrs and typewriters to facilitate their written work.

The InfoWindow system is supported on IBM ATs or XTs linked to Pioneer videodisk players. The computers are not networked and can run off-the-shelf IBM software, as can the PCjrs. Depending on where they are in the curriculum, students perform different activities in the laboratory, working individually on the PCjrs and typewriters and in pairs at the InfoWindow systems. Management functions within the structured environment are maintained by a classroom administrator.

The PALS system was created by John Henry Martin, author of IBM's Writing-To-Read Program for beginning readers. It uses a multimedia presentation, in which an alphabetical system is invented to prevent a war between two kingdoms. The narrative is designed to dramatize the importance of the written word. By interacting with the PALS system, students learn alphabetical

principles and phonics.

The PALS system is targeted at older, poor readers and at-risk students. It is designed to be used an hour and a half a day, five days a week.

Martin Luther King Jr. High School

In late February, 1987, the PALS system became operational at Martin Luther King Jr. High School in Manhattan, where it served 36 Chapter I and special education students in grades nine through twelve. The laboratory was equipped with four InfoWindow systems, eight PCjrs, and four typewriters organized into twelve workstations. A teacher/coordinator, a classroom teacher, and a paraprofessional supervised students, who spent two 40-minute periods a day using the system. There was a six-to-one student/staff ratio in the laboratory, with students using the computers both individually and in pairs in accordance with the requirements of the program. The school also has IBM PC computers, which the targeted students used in addition to the PALS system.

One coordinator, one teacher, and two students were interviewed.

Staff. The coordinator said that PALS "charged student interest in learning," and that it was appropriate to the needs of the target population. The coordinator thought that the training provided was adequate, but that more training would be useful, as would a writing component in the program. The coordinator believed that the businesslike atmosphere the program

set up was especially conducive to achievement.

Teachers. The teacher interviewed thought the PALS system was very helpful in improving student motivation, attendance, and attitudes. Although she considered it too soon to judge whether the program was affecting student achievement, she believed that it was. She believed the system was not as effective for special education students as it was for other target groups, due to the complexity of the program and its demanding and structured nature. The teacher also believed more training would be useful.

Students. The students interviewed both believed that their use of the PALS system had caused them to enjoy school more and to have a greater desire to attend, and that it had improved their feelings about themselves and their learning abilities. They stated that the system helped them with their school work, and that it was easy to use.

Thomas Jefferson High School

In November, 1986, the PALS system was installed at Thomas Jefferson High School in Brooklyn. Using a workstation computer laboratory, the system served 72 remedial students in grades nine through twelve. Two teachers and a paraprofessional administered the program in which target students participated for two 40-minute periods every day. There was a seven-to-one student/staff ratio in the laboratory, with students using the computers both individually and in pairs. The school also has IBM and Apple computers, which were not used by the targeted

students.

One administrator, one coordinator, one teacher, and eight students were interviewed.

Staff. The administrator didn't think the PALS system was appropriate for all students, but did think that it was very motivating for an at-risk population. The coordinator thought that the students' use of the system had improved their achievement in reading, writing, and typing. The administrator was especially pleased by improved student attitudes, maintaining that participating students exhibited a new confidence, a sense of responsibility, and a cooperative spirit. Both the administrator and the coordinator thought that more training was needed.

Teachers. The teacher interviewed indicated that the PALS system was very helpful in improving students' motivation, achievement, and attitudes, and moderately helpful in improving attendance. He stated that the use of the program had had a remarkable impact on students' writing and typing skills, as well as on their interest in learning, and that it had an equally positive impact on his own feelings about teaching. The teacher agreed that more training was needed, and said that a hard copy of the PALS story would be useful.

Students. All students interviewed agreed that their participation in the program had improved their feelings about themselves and their learning abilities; and most agreed that it had caused them to enjoy and attend school more (in both cases,

seven students agreed and one did not). They reported that the system was fun and easy to use and that it helped them with their school work. All found the keyboarding training especially useful.

PC/CLASS

The PC/Class system is an instruction management system that correlates learning objectives with coursework presented on IBM PC systems linked by a Novell network and hard disk server. It is an open system that allows any software running on an IBM to be added to the central server at any time and correlated to particular learning objectives. The new software will then be managed by the system. Mastery of the package is taken by the system to mean mastery of the stated objectives.

The diagnosis component of the system allows teachers to construct their own test or use a ready-made one to determine a student's mastery of any given set of objectives. Test items can be selected by objective from a system database. The prescription component provides a menu of software that addresses the objectives a student has yet to master. Learning objectives which correlated with N.Y.C. curriculum are being developed.

Students are retested until they are successful at a particular objective. An activity log records time on task, level and activity, objectives mastered, and test results, but does not give feedback that shows the specific areas where errors have been made. Suggested use of the system is for two 40-minute sessions per week.

J.H.S 141

In January, 1987, the PC/Class network was installed on 16 workstations at J.H.S. 141 in Queens, where it was used by 140 ninth-grade general education students one 45-minute period a week for math and language arts remediation. Five teachers participated in the program; no paraprofessionals were available. Students worked in groups of two or three, and there was a 17-to-1 student/teacher ratio in the laboratory. The school also has Tandy computers, but they were not used by the targeted students.

One administrator, one coordinator, four teachers, and four students were interviewed.

Staff. Both the administrator and the coordinator were pleased with the PC/Class system, reporting that it was easy to use. They thought that use of the system had improved participating students' achievement, attitudes, and attendance. They believed that the training they received was good, but that more training was needed, as were more computers and more software. The coordinator, who is also a full-time teacher, thought that a full-time computer resource person was also needed.

Teachers. The teachers likewise believed that more training, more computers, and more interesting software were needed. They generally thought that the system was useful in improving students' motivation (one teacher found it moderately useful; three teachers, very useful), achievement (three teachers, moderately useful; one teacher, very useful), and

attitudes (one teacher, moderately useful; three teachers, very useful). Two teachers thought that use of the system had not affected attendance, one believed it was minimally helpful, and one thought it was very helpful. All teachers reported integrating use of the system into their regular activities.

Students. Students interviewed said that they found the system interesting and fun to use, and that it helped them in their learning. All reported that their enjoyment of school and their feelings about themselves and their learning abilities had improved. The students were divided as to whether their use of the system had changed their desire to attend school.

Susan Wagner High School

In March, 1987, the PC/Class system was implemented on 17 IBM workstations at Susan Wagner High School in Staten Island, where it was used by 120 ninth- and tenth-grade students for remedial reading and mathematics instruction for two 40-minute periods a week. Three teachers and one paraprofessional supervised students' work. Students worked mostly individually but sometimes in pairs on the computers. There was a 12-to-1 student/staff ratio in the laboratory. The school also has IBM PC computers, which were used by the targeted students in addition to the PC/Class system.

One administrator, three teachers, and seven students were interviewed.

S[redacted]trator at this school is also the computer coordinator. She was positive about the system,

especially in that it gave both students and teachers a "break from traditional classroom structures." She said that use of the system had resulted in improved student achievement, but not attendance, and that her staff had become more positive about computers since the program's inception. She thought that the training provided was adequate, but that more time was needed to preview software. She also thought that system reports listing specific student errors would be more useful.

Teachers. The participating teachers had a mixed response to the PC/Class system; their reaction was based mostly on the available software. With regard to improving student motivation, one teacher found it minimally helpful; and two teachers, very helpful. Their response was also mixed with regard to improving attendance (one teacher, not helpful; one teacher, moderately helpful; one teacher, very helpful), improving achievement (one teacher, minimally helpful; one teacher, moderately helpful; one teacher, very helpful), improving student attitudes (one teacher, minimally helpful; one teacher, moderately helpful; one teacher, very helpful). Reading teachers commented, "It works," and "It perked me up," but the mathematics teacher thought the software provided was boring, routine, and not well suited to his curriculum. The teachers generally believed the training they received was good. They thought the reports that the system generated were adequate, but that the reports would be better if they highlighted exact student errors.

Students. Students interviewed stated that the system was interesting, fun, and easy to use, and that it helped them in their learning. They thought that some of the software was too easy, and requested more programs. All students believed that their use of the system had added to their enjoyment of school, and most thought it increased their desire to attend (six agreed, one did not), and had improved their feelings about themselves and their learning (six agreed, one did not).

PLATO

As currently used in New York City schools, the PLATO system is a multiuser system that runs on an IBM-based network, using an IBM AT as a server and IBM PCs or PC compatibles as workstations. School-owned PCs can also be modified with an upgrade kit to function as workstations. Such a network can accommodate up to 30 students working at different levels, and remote sites can be serviced from the central computer via modems and phone lines.

Plato courseware is available covering practically the full range of typical high school offerings -- English, language arts, mathematics, science, social studies, business, life skills -- in multiple modes such as drill and practice, tutorials, simulations, and games. The software uses graphics, sound, and animation. Certain packages additionally include audiotape voice components that are heard through headsets at the workstations. When workstations include floppy disk drives, they can also be used to run standard IBM packages.

The Plato system contains a management component that places students and tracks their progress in the system, and produces regular reports that include the length of time spent on a task, the lesson's difficulty, class standing, and the number of tries needed to master each activity. The system also offers administrative software for scheduling and budgeting, spreadsheet, and word processing, all of which are driven by the central computer. Suggested use of the system is for three 40-minute sessions per week.

South Bronx High School

In December, 1986, the Plato system became operational on 30 workstations at South Bronx High School. It was used with 250 Chapter I and general education students in grades nine through twelve for drill and practice and tutorials in a wide range of subject areas -- English, mathematics, language arts, science, social studies, business, and life skills. Seven teachers and three paraprofessionals supervised students in the laboratory, where there was a 12-to-1 student/staff ratio, and a one-to-one student/computer ratio. In general, students used the laboratory for two 40-minute periods a week. In addition to the Plato system, some of the targeted students also used the school's Tandy and IBM computers.

One administrator, one coordinator, four teachers, and six students were interviewed.

Staff. Both the administrator and the computer coordinator had very positive attitudes towards the Plato system.

Both said that the training participating teachers received was very good, and that the teachers had become more involved in using the system. The administrator believed that the system had great applicability to a high school curriculum, and he wanted to use the system to offer advanced courses to small groups of eligible students. The coordinator thought that students' experience with the system had resulted in both improved attendance, better attitudes, and higher achievement (as evidenced by higher Regents Competencies Test scores). Both the administrator and the coordinator noted that the Plato management system sends a student back to the very beginning of an activity when he or she fails to navigate a more advanced step, and thought that this should be corrected. Both thought that more computers and an additional paraprofessional would be useful.

Teachers. The teachers interviewed were likewise very positive about the Plato system, noting improvements in students' motivation (one teacher thought it moderately helpful; three teachers, very helpful), attendance (three teachers, moderately helpful; one teacher, very helpful), achievement (four teachers, moderately helpful), and attitudes (one teacher, moderately helpful; three teachers, very helpful) as a result of their participation in the system. They were especially pleased with the potential the system offered for democratizing and optimizing learning, and with its effects on themselves and their students. Teachers uniformly reported integrating courseware with their regular classroom activities, and indicated that they

wanted reports showing the exact nature of student errors so that in-class remediation could be provided.

Students. All students interviewed stated that their experience with the Plato program had increased their enjoyment of school and their desire to attend, and that it had helped them have better feelings about themselves and their learning abilities. All students thought that the system was fun and easy to use, but some thought that the programs were too easy. Many students were annoyed at being dropped back to the beginnings of lessons whenever they failed a step.

TANDY/ESC

The Tandy/ESC package combines up to 32 Tandy 1000 MS-DOS-compatible computers in a network environment with software developed by Education Systems Corporation (ESC). An on-site facility management service is provided with the package, as well as computer-controlled student management and performance reporting systems. The software and the laboratory technician do all the preparation and administration.

The Tandy/ESC system comes with 1500 lessons in reading and mathematics with an emphasis on basic knowledge, operation skills, applications, and higher-order thinking. The software includes text, graphics, voice, sound effects, and music. The management component monitors and tailors each student's progress, and generates invididual and class reports detailing time spent on each task, particular students' strengths and weaknesses, and their numerical and percentile scores. The MS-

DOS compatibility of the computers makes them capable of running other IBM software in addition to that provided by ESC. Suggested use of the system is for three to five 20-minute sessions each week.

P.S. 332

In October, 1986, the Tandy/ESC system was implemented on 28 workstations at P.S. 332 in Brooklyn. Approximately 500 students in grades one through six used the system for two 20-minute sessions each week. Seventeen teachers and two paraprofessionals were involved in the program. There was a 12-to-1 staff/student ratio and a one-to-one student/computer ratio in the laboratory. Some students in the program also used the school's Commodore computers.

One administrator, sixteen teachers, and ten students were interviewed.

Staff. The administrator was very positive about the system and said that it was an "excellent morale booster for both students and teachers." He believed that use of the system had resulted in improved student attitudes, achievement, and attendance, noting especially an improvement in behavior among special education students. He requested more free time for teachers for planning, troubleshooting, software review, and getting feedback concerning student progress.

Teachers. The teachers were generally enthusiastic about the system. Most indicated that it had been helpful in improving students' motivation (one teacher found it minimally helpful;

three teachers, moderately helpful; twelve teachers, very helpful), achievement (one teacher, not helpful; three teachers, minimally helpful; eight teachers, moderately helpful; four teachers, very helpful), and attitudes (three teachers, minimally helpful; seven teachers, moderately helpful; six teachers, very helpful), but that it had not significantly improved attendance (four teachers, not helpful; six teachers, minimally helpful; four teachers, moderately helpful; two teachers, very helpful). Most found the system motivating and fun, and reported integrating work on the system with regular classroom activities. They particularly liked the system because the students were getting reinforcement in their particular areas of weakness. Most teachers reported receiving good training, but requested more. Likewise, most found the system reports useful, but wanted more frequent reports and more time to go over the reports with the laboratory technician. Many teachers thought that the computer assistant's lack of educational training was a drawback. Some teachers thought that the system should be expanded to include science and social studies courseware and word processing capabilities, and many stated that they would like more time for the students on the computers.

Students. The students interviewed generally found the system fun, interesting, and easy to use. They said it helped them with their schoolwork. Most thought that their use of the system had resulted in greater enjoyment of school (nine students agreed, one did not) and an increased desire to attend (five

agreed, five did not), and most thought that it resulted in better feelings about themselves and their learning abilities (nine agreed, one did not).

WICAT

A multi-user system that supports up to 32 student workstations, WICAT uses dedicated terminals, but offers the option of connecting IBM or Apple computers to the system with an adapter kit. When standard computers are used as terminals, they will support standard software in addition to the software provided by the WICAT system.

Offering a range of courseware in language arts, creative writing, reading, and mathematics, WICAT uses color graphics, animation, and sound. Workstations are equipped with headsets to add a human voice component. In addition, the system provides administrative software for scheduling, budgeting, spreadsheets, and word processing. The management component of WICAT monitors and tracks each student's progress and produces printed reports that detail time spent on the task and mastery of program objectives. Suggested use of the system is for three 30-minute sessions per subject per week.

P.S. 31

In January, 1987, the WICAT system was installed at P.S. 31 in the Bronx. The system's 15 workstations were used for three 45-minute sessions a week by five second-grade resource room students for remedial reading and mathematics, 15 third-

room students for remedial reading and mathematics, 15 third-grade Chapter I students for mathematics, and 45 fourth-grade Chapter I students for reading and mathematics. Other users included 15 fifth-grade Chapter I students for mathematics, 45 fourth-grade Chapter I students for reading and mathematics, and 15 fifth-grade Chapter I students for reading. In addition, the system was used by 95 fourth- and fifth-grade gifted students for one 45-minute creative writing session each week. Nine teachers were involved in the program. No paraprofessionals were available to help out in the laboratory. All students except those using it for creative writing worked alone on the computers, and there was generally a 15-to-1 student/teacher ratio in the laboratory. The school also has Apple computers, which were used by some of the students in addition to the WICAT system.

One coordinator, five teachers, and six students were interviewed.

Staff. The coordinator, who is part-time, stated that a full-time laboratory teacher was needed. The coordinator believed that the system was generally productive, and said that she would like to see it utilized for music, art, and science, as well as reading, writing, mathematics, and computer literacy. The coordinator also believed that the training teachers received was good and that the system was easy to use. The coordinator reported positive changes in students' attitudes and achievement, and possibly, improved attendance, as well as very positive

teacher attitudes toward the system.

Teachers. The teachers interviewed were indeed positive about the system, believing it to have been helpful in improving student motivation (all five teachers found it very helpful), attendance (three teachers, moderately helpful; two teachers, very helpful), achievement (four teachers, moderately helpful; one teacher, very helpful), and attitudes (two teachers, moderately helpful; three teachers, very helpful). Most reported integrating laboratory activities into their regular classes in the form of discussions, storystarters, and pre-writing activities. All found the training and reports they received useful, but asked for further training and additional feedback, particularly an analysis of writing skills. The teachers also requested more computers, so that the laboratory could better accommodate full classes and offer more laboratory time for students.

Students. All the students interviewed were very positive about the WICAT system, stating that its use had resulted in their enjoying school more, wanting to attend more classes, and feeling better about themselves and their learning abilities. They found the system generally fun, interesting, and easy to use, and reported that it had helped them with their school work. Many stated that they liked making stories and printing them out. A few complained that the screen was too small and not in color. They all agreed that they would like

to see more computers in the laboratory and spend more time on the system.

III. CONCLUSIONS AND RECOMMENDATIONS

SUMMARY

By the end of the 1986-87 school year, vendor systems were installed and operational in all of the nineteen schools selected. Hardware and software problems had been or were being satisfactorily resolved by the vendors, and school staffs had received training, although many expressed a desire for more. School administrators, program coordinators, teachers, paraprofessionals, and students were all generally positive about the systems with which they were involved. The major task remaining is the selection of target and control populations for quantitative evaluation of attendance and achievement records in the 1987-88 school year. Preliminary conclusions for each of the ten pilot systems and general recommendations follow: _

CONCLUSIONS

Autoskills. The Autoskills system is a dedicated system limited to phonics instruction and requiring intensive staff time. Several issues were identified concerning the lack of immediate feedback to users, poor reporting, and the Canadian accent of the speaker on the audio component. Staff and student reactions to the system, however, were positive. Some of the problems are being worked on, and the system was not in place long enough to make a definitive evaluation. Evaluation should be continued.

Computer Curriculum Corporation (C.C.C.)/I.S.I. A quasi-dedicated network using complicated hardware, C.C.C.'s implementation problems were so severe that the remote site had to be withdrawn from the evaluation. But staff and student reactions to the system were positive, and other research indicates highly positive results with the target population. Evaluation should be continued.

Comprehensive Competencies Program. The Comprehensive Competencies Program is a multi-media package that uses general-purpose hardware, leaving open many possibilities not being evaluated at this time. Staff and student reaction to the system was positive, although teachers asked for and should receive more training and more time to preview software. The system has only been in place in both schools for a very limited time, making definitive evaluation impossible. The evaluation should be continued.

Corvus/Ideal. Corvus is an open networking system for both Apple and IBM computers. It was used to distribute Ideal software in this evaluation, but is capable of supporting most educational software. Staff and student response to the combined system was positive, although reports of cultural bias in some software programs should be investigated. Teachers asked for and should receive more training and more time to preview software. This system had only been in place for three months at the time of the evaluation; hence, definitive evaluation was not possible.

Evaluation should be continued.

Degem. A dedicated system designed to provide drill and practice, as well as remedial instruction, Degem has been used by a large number of general education students. Some students found it boring, but, in general, student and staff reaction to the system was positive. It should be determined whether remedial students or general education students or both, reported being bored by the program. Teachers asked for and should receive more training. The evaluation should be continued, but it should be limited to the target population.

PALS. A quasi-open, multi-media system using state-of-the-art technology, including interactive video disk, the PALS system is run on IBM ATs, while the PCjrs are used for typing skills. The hardware used support other software programs. Staff and students using the system were very positive about it; however, the system had not been in place long enough to reach any definite conclusions about its usefulness. The evaluation should be continued.

PC/Class. The IBM/Class system is an open management and networking package that can utilize any software running on an IBM PC. Students were positive about the system. However, teachers' reactions to the software were mixed. Teachers requested and should be given more training and more time to preview software. The system had only been in place for a short period at the time of the evaluation, and it was used with a

general education population, making definitive evaluation impossible. The evaluation should be continued, but it should be limited to the target population.

Plato. A dedicated networking system for Plato software programs, the Plato system offers a wide variety of software that program participants report is highly correlated with most high school curricula. Although both teachers and students interviewed were frustrated with certain of the system's branching mechanisms, they were generally positive about the system's effects. However, late implementation, the use of software covering content areas outside the bounds of this evaluation, and system use by nontargeted general education students precluded definitive conclusions. Evaluation should continue but should be limited to studies of remedial students using reading and mathematics programs.

Tandy/ESC. The Tandy/ESC package is an open networking system whose MS-DOS environment supports any IBM-compatible software. Staff and students were generally positive about the system, although teachers asked for and should receive more training. Staff requested and should receive more time to confer with the laboratory coordinator. A problem for this evaluation was the use of the system by general education students. Evaluation should be continued, but it should be limited to the target population.

WICAT. A dedicated network, the WICAT system also offers

the option of adapting standard computers to system use. How difficult it is to implement such adaptation is not clear. Staff and students were positive about this program, although some of the most positive comments were from teachers and students participating in a gifted students' writing program that is outside the bounds of this investigation. Teachers asked for and should receive more training and more time to preview the available software. Additionally, staff requested more computers to accommodate full classes that were forced to have some students "sit out" each session this year. This problem should be alleviated, and evaluation should be continued, but it should be limited to targeted students and program areas.

RECOMMENDATIONS

Overall, generally positive reports from staff and students at all sites involved in the Computer Pilot Program could indicate that the consistent use of any well-structured computer programs dedicated to mathematics and/or reading remediation benefits students in need of such extra help. The 1987-88 investigation should concentrate on determining whether test scores and attendance records support participant feelings. That research should additionally include a closer analysis of the systems being evaluated, attempting, in particular, to discern which are beneficial to particular student groups. Other important evaluative considerations could include such issues as cost-effectiveness, time-on-task, ease of use, level of vendor support, and significant problems with hardware and/or software.